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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/681,007

10/08/2003

Antonio Criminisi

MS1-1631US

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22971 7590 09/12/2007  
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EXAMINER

LIEW, ALEX KOK SOON

ART UNIT

PAPER NUMBER

2624

NOTIFICATION DATE

DELIVERY MODE

09/12/2007

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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a-rydore@microsoft.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/681,007	<b>Applicant(s)</b> ANTONIA CRIMINISI	
	<b>Examiner</b> Alex Liew	<b>Art Unit</b> 2624	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 4, 5, 16, 17, 19, 20, 31, 32, 34 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Roy (US pat no 6,046,763).

With regards to claim 1, Roy reads on a method comprising:

computing a minimum cost path in a stereo disparity model between a scan line of a first image and a corresponding scan line of a second image of a stereo image pair (see figure 1, the left diagram shows two axis, horizontal axis being line from the first image and vertical axis being line from the second image, discussed on column 4 lines 43 to 47), the stereo disparity model distinguishing between non-fronto-parallel matched pixels in each scan line and occluded pixels in each scan line (see column 5 lines 43 to 67,  $reg(u,v)$  is reads as the non-fronto-parallel pixels and  $occ(u,v)$  is read as the occluded pixels).

With regards to claim 2, Roy reads on a method of claim 1, wherein the computing operation comprises computing matching costs for each pixel of each scan

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line pair (see figure 13, element 1340, the depth map is computed for the entire image, which includes every lines in the images).

With regards to claim 4, Roy reads on a method of claim 1, wherein the computing operation comprises altering the matching costs for at least one pixel pair based on whether the pixel pair is determined to be associated with a non-fronto-parallel surface or an occlusion (see column 7, lines 34 to 40).

With regards to claim 5, Roy reads on a method of claim 1, wherein the computing operation comprises determining a minimum cost path in the stereo disparity model (see equation on column 5, lines 45 to 53, is a disparity model).

With regards to claims 16 and 31, see the rationale and rejection for claim 1.

With regards to claims 17 and 32, see the rationale and rejection for claim 2.

With regards to claims 19 and 34, see the rationale and rejection for claim 4.

With regards to claims 20 and 35, see the rationale and rejection for claim 1.

***Claim Rejections - 35 USC § 103***

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1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 3, 18 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roy ('763) as applied to claim 1, further in view of Chupeau (US pat no 5,727,078).

With regards to claim 3, Roy discloses all the limitations in claim 1, but does not disclose computing matching costs for each pixel of each scan line pair using a windowed matching cost function. Chupeau discloses computing matching costs for each pixel of each scan line pair using a windowed matching cost function (see column 6, lines 20 to 27). One skilled in the art would include windowed matching cost function because to located the desired object in the image in the pair stereo images, to compute the disparity and depth of the object; this leads to computing the three dimensional image of the object which gives more details.

With regards to claims 18 and 33, see the rationale and rejection for claim 3.

3. Claims 6 – 10, 21 – 25 and 36 - 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roy ('763) as applied to claim 1 further in view of Usami (US pat no 4,982,438).

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With regards to claims 6 to 8, Roy discloses all the limitations discussed in claim 1, but does not disclose applying a cost penalty to move from an occluded pixel pair to a matched pixel pair.

However, Roy suggests, treating occlusion pixels by changing the edge capacities specific to a different match, such as matching any set of pixels to another set of occlusion pixels or non-occlusion pixels (see column 7, lines 36 to 39, the change in the edge capacities reads on applying a cost penalty). Usami discloses plurality of penalty costs (see figure 12a, S1, S7, S13, S19, S25, are the plurality of penalty; also see column 8, lines 31 to 37).

One skilled in the art would include applying a cost penalty because to determine if the current pixel matches with a background pixel or foreground pixel, which improves on matching method to create a more accurate stereoscopic image.

With regards to claim 9, Roy discloses all the limitations in claim 1, but does not disclose applying second penalty cost. Usami discloses applying a first cost penalty to a move from an occluded pixel pair to another occluded pixel pair (see figure 12A, S13 is the first cost penalty; also see column 8, lines 31 to 37); and applying a second cost penalty to a move from a matched pixel pair to an occluded pixel pair, the first cost penalty being different than the second cost penalty (see figure 12A, S1 is the first cost penalty; also see column 8, lines 31 to 37, S1 and S13 are located at different nodes).

One skilled in the art would include applying a cost penalty because to determine if the

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current pixel matches with a background pixel or foreground pixel, which improves on matching method to create a more accurate stereoscopic image.

With regards to claim 10, Roy discloses all the limitations in claim 1, but does not disclose applying second penalty cost. Usami discloses applying a first cost penalty to a move from an occluded pixel pair to another occluded pixel pair (see figure 12A, S13 is the first cost penalty; also see column 8, lines 31 to 37); and applying a second cost penalty to a move from a matched pixel pair to an occluded pixel pair, the first cost penalty is less than the second cost penalty (see figure 12A, S1 is the first cost penalty; also see column 8, lines 31 to 37, S1 and S13 are located at different nodes, S1 being the older path). One skilled in the art would include applying a cost penalty because to determine if the current pixel matches with a background pixel or foreground pixel, which improves on matching method to create a more accurate stereoscopic image.

With regards to claims 21 – 23 and 36 – 38, see the rationale and rejection for claims 6 – 8.

With regards to claims 24, 25, 39 and 40, see the rationale and rejection for claims 9 and 10.

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4. Claims 11, 12, 14, 15, 26, 27, 29, 30, 41, 42, 44 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roy ('763) as applied to claim 1, further in view of Chen (US pat no 6,556,704).

With regards to claim 11, Roy discloses all the limitations discussed in claim 1, and also discloses a disparity of the corresponding pixels being characterized by a minimum cost path of the stereo disparity model (see equation on column 5, lines 45 to 53, is a disparity model), but does not disclose computing a cyclopean virtual image. Chen discloses computing a cyclopean virtual image scan line based on corresponding pixels of scan lines of the first and second images (see figure 1, element 13a and 13b are the first and second image, respectively, and the depth map, 10, is read as the virtual image). One skilled in the art would include computing a cyclopean virtual image because to create a three-dimensional image, where this three-dimensional image shows more details on the object in the image, which improves recognition of the object in the image.

With regards to claim 12, Roy discloses all the limitations discussed in claim 1, but does not disclose computing a cyclopean virtual image. Chen discloses computing a cyclopean virtual image scan line based on corresponding pixels of scan lines of the first and second images (see figure 1, element 13a and 13b are the first and second image, respectively, and the depth map, 10, is read as the virtual image), wherein corresponding pixels that are matched are projected as a virtual pixel onto cyclopean

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virtual image scan line (see figure 1, the depth map are the result from first and second images' projection). One skilled in the art would include computing a cyclopean virtual image because to create a three-dimensional image, where this three-dimensional image shows more details on the object in the image, which improves recognition of the object in the image.

With regards to claim 14, Roy discloses all the limitations discussed in claim 1, but does not disclose computing a cyclopean virtual image. Chen discloses computing a cyclopean virtual image scan line based on corresponding pixels of scan lines of the first and second images (see figure 1, element 13a and 13b are the first and second image, respectively, and the depth map, 10, is read as the virtual image), wherein a non-occluded pixel of an occluded pair of corresponding pixels is projected as a virtual pixel onto the cyclopean virtual image scan line from a background disparity in the stereo disparity model (see figure 1, the top and bottom image contains occluded pixels, read as the person in the image, and non-occluded pixels, read as the foreground; both images are matched using disparity method and the projected depth image is shown in the depth image, which is read as virtual image). One skilled in the art would include computing a cyclopean virtual image because to create a three-dimensional image, where this three-dimensional image shows more details on the object in the image, which improves recognition of the object in the image.

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With regards to claim 15, Roy discloses all the limitations discussed in claim 1, but does not disclose computing a cyclopean virtual image. Chen discloses computing a cyclopean virtual image scan line based on corresponding pixels of scan lines of the first and second images (see figure 1, element 13a and 13b are the first and second image, respectively, and the depth map, 10, is read as the virtual image), wherein a value of a non-occlusion pixel of an occluded pair of corresponding pixels is selected as a value of a resulting virtual pixel on the cyclopean virtual image scan line (see figure 1, the occluded pixels are those that belong to the object image and non-occluded pixel belongs to the background; both the top and bottom images are use to generating the depth image, which is read as the virtual image). One skilled in the art would include computing a cyclopean virtual image because to create a three-dimensional image, where this three-dimensional image shows more details on the object in the image, which improves recognition of the object in the image.

With regards to claims 26 and 41, see the rationale and rejection for claims 11.

With regards to claims 27 and 42, see the rationale and rejection for claims 12.

With regards to claims 29 and 44, see the rationale and rejection for claims 14.

With regards to claims 30 and 45, see the rationale and rejection for claims 15.

5. Claims 13, 28 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roy ('763) as applied to claim 1, further in view of Anandan (US pat no 6,198,852).

With regards to claim 13, Roy discloses all the limitations discussed in claim 1, but does not disclose averaging pixels to obtain virtual pixels. Anandan discloses computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images (see figure 10, element 1070 is read as the virtual image, and see figure 5 and figure 6, are the first and second images), wherein corresponding pixels that are averaged to determined a value of a resulting virtual pixel on the cyclopean virtual image scan line (see column 18, lines 63 to 66). One skilled in the art would include averaging pixels to obtain virtual pixels because to obtain a value closest to the actual value, improving the three-dimensional generation of the object in the image.

With regards to claims 28 and 43 see the rationale and rejection for claim 13.

### **Conclusion**

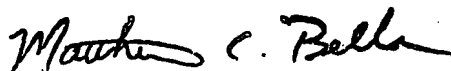
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alex Liew whose telephone number is (571)272-8623. The examiner can normally be reached on 9:30AM - 7:00PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alex Liew  
AU2624  
9/3/07

A handwritten signature in black ink that reads "Matthew C. Bella". The signature is fluid and cursive, with the first name "Matthew" being more prominent than the last name "Bella".

MATTHEW C. BELLA  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600